UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/593,459	09/19/2006	Miho Gemba	043888-0511	9980

20277 7590 12/22/2011

MCDERMOTT WILL & EMERY LLP
600 13TH STREET, N.W.
WASHINGTON, DC 20005-3096

EXAMINER	
SCULLY, STEVEN M	

ART UNIT	PAPER NUMBER
1727	

NOTIFICATION DATE	DELIVERY MODE
12/22/2011	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

mweipdocket@mwe.com

Office Action Summary	Application No.	Applicant(s)	
	10/593,459	GEMBA ET AL.	
	Examiner	Art Unit	
	STEVEN SCULLY	1727	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *01 November 2010*.

2a)☐ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on _____; the restriction requirement and election have been incorporated into this action.

4)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

5)☒ Claim(s) *1-8 and 11-13* is/are pending in the application.

5a) Of the above claim(s) _____ is/are withdrawn from consideration.

6)☐ Claim(s) _____ is/are allowed.

7)☒ Claim(s) *1-8 and 11-13* is/are rejected.

8)☐ Claim(s) _____ is/are objected to.

9)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

10)☐ The specification is objected to by the Examiner.

11)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

12)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

FUEL CELL AND FUEL CELL STACK COMPRISING THE SAME

Examiner: Scully S.N.: 10/593,459

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on November 1, 2010 has been entered. Claim 1 has been amended and claims 9 and 10 have been canceled. Accordingly, claims 1-8 and 11-13 are pending examination in the application.

2. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

Claim Rejections - 35 USC § 103

3. Claims 1-8 and 11-13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ohara et al. (US2004/0209148).

With respect to claim 1, Ohara et al. disclose a polymer electrolyte fuel cell comprising a membrane electrode assembly having an anode (2a), a cathode (2b) and a polymer electrolyte membrane (1) disposed therebetween. An anode-side separator

(10) and a cathode-side separator (20) are provided. A cooling fluid channel (14b, 24b) is provided between the separators of adjacent fuel cell units. See Figure 11. A fuel gas channel for supplying and exhausting a fuel gas to/from the anode separator and an oxidant gas channel for supplying and exhausting oxidant gas to/from the cathode separator are provided. See Figures 14 and 15. A cathode-side gasket (150) and an anode-side sealing member (180) are provided. Clearance is provided between the cathode (201) and the sealing member (150) represented by l_1, and clearance between the anode (202) and the sealing member (180) is represented by l_2. See Figure 43; paragraph [0252]. This configuration ensures discharge of water. See [0081].

Ohara et al. do not disclose the cooling fluid channel, fuel gas channel and oxidant gas channel to be substantially parallel, but disclose the coolant flow field to be perpendicular to the cathode and anode flow fields. However, it would have been obvious to one having ordinary skill in the art at the time of the invention to rearrange the flow fields to be parallel and thus have inlets and outlets on the same sides, since it has been held that rearranging parts of an invention involves only routine skill in the art. *In re Japikse*, 86 USPQ 70. Upon parallel rearrangement, an upstream portion of the cooling fluid channel would correspond to a region of the anode and/or cathode side gaps and a middle stream portion would correspond with the fuel and oxidant gas channels.

Further limitations regarding the flow direction of the cooling fluid and the flow direction of the reaction gas are drawn to a method of use, and therefore do not further limit the claim. Ohara et al. disclose the configuration as discussed above. It is the

position of the Examiner that the flow fields would thus operate in substantially the same direction in view of *In re Japikse*, as discussed above.

Ohara et al. further disclose the channels to have a serpentine structure. See Figs. 34-36.

With respect to claim 2, Ohara et al. disclose the polymer electrolyte membrane (203) to have a larger main surface than the electrodes (201, 202). The gaskets sandwich the entire periphery of the polymer electrolyte membrane (see Figure 38). The anode-side gap comprises boundaries of the anode, polymer electrolyte membrane and the anode-side gasket and the cathode-side gap comprises boundaries of the cathode, polymer electrolyte membrane and the cathode-side gasket. See Figure 43.

With respect to claim 3, the limitation is a method of use. Ohara et al. disclose the same configuration as discussed above with respect to claim 1, and thus it is the position of the examiner that the limitations of claim 3 would occur during use of the fuel cell. Further, Ohara et al. disclose the configuration having the clearance gaps ensures discharge of water. See [0081].

With respect to claim 4, Ohara et al. disclose the configuration as discussed above with respect to claim 1, wherein the upstream portions of the cooling fluid channels correspond to the anode/cathode clearance gaps and the middle stream portion correspond to the fuel/oxidant gas channels. See Figs. 34, 36 and 43, for example.

With respect to claim 5, Ohara et al. disclose the anode and cathode clearance gaps formed by continuous sealant members (which appear to have the same shape as

applicant's "continuous circular members") having coolant inlet and outlet manifolds. See Figures 7, 9 and 43. The reactant inlet to outlet path is diagonally across the fuel cell stack, and thus both routes of Ohara et al. would be the same length. However, it would have been obvious to one having ordinary skill in the art at the time of the invention to rearrange the flow field inlets and outlets to be directly across from one another, since it has been held that rearranging parts of an invention involves only routine skill in the art. *In re Japikse*, 86 USPQ 70.

With respect to claims 6 and 7, Ohara et al. disclose the configuration as discussed above with respect to claim 1, wherein the upstream portion of the cooling fluid channel corresponds to first and second routes of the anode/cathode side gaps.

With respect to claim 8, Ohara et al. disclose the configuration as discussed above with respect to claim 1, wherein the streams of the coolant and fuel and oxidant channels correspond to each other.

With respect to claim 11, Ohara et al. disclose a fuel cell stack comprising the fuel cells as discussed above with respect to claim 1. See Figure 11.

With respect to claim 12, Ohara et al. disclose gaps between the sealants 150, 180 and the electrodes 201, 202 as discussed above. See Figure 43. As is depicted for example in Figure 24, the membrane electrode assembly (dotted line) is larger than the flow fields. Thus, the length of the anode and cathode side-gaps would necessarily be longer than then length of the upstream coolant flow field channel.

With respect to claim 13, Ohara et al. do not explicitly disclose the limitation. However, it is the position of the Examiner this limitation is simply a mode of

distinguishing the portions of the fuel gas channel and oxidant gas channel that are so-named "the middle stream portion and subsequent portion" of each gas channel, as discussed in the instant specification at paragraphs [0033-0036], and thus does not further limit the product of the fuel cell of claim 1.

4. Claims 1-8 and 11-13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ohara et al. (US2004/0209148) in view of Sugiura et al. (US2004/0106028).

With respect to claim 1, Ohara et al. disclose a polymer electrolyte fuel cell comprising a membrane electrode assembly having an anode (2a), a cathode (2b) and a polymer electrolyte membrane (1) disposed therebetween. An anode-side separator (10) and a cathode-side separator (20) are provided. A cooling fluid channel (14b, 24b) is provided between the separators of adjacent fuel cell units. See Figure 11. A fuel gas channel for supplying and exhausting a fuel gas to/from the anode separator and an oxidant gas channel for supplying and exhausting oxidant gas to/from the cathode separator are provided. See Figures 14 and 15. A cathode-side gasket (150) and an anode-side sealing member (180) are provided. Clearance is provided between the cathode (201) and the sealing member (150) represented by l_1, and clearance between the anode (202) and the sealing member (180) is represented by l_2. See Figure 43; paragraph [0252]. This configuration ensures discharge of water. See [0081].

Further limitations regarding the flow direction of the cooling fluid and the flow direction of the reaction gas are drawn to a method of use, and therefore do not further limit the claim. Ohara et al. disclose the configuration as discussed above. It is the

position of the Examiner that the flow fields would thus operate in substantially the same direction in view of *In re Japikse*, as discussed above.

Ohara et al. further disclose the channels to have a serpentine structure. See Figs. 34-36.

Ohara et al. do not disclose the cooling fluid channel, fuel gas channel and oxidant gas channel to be substantially parallel, but disclose the coolant flow field to be perpendicular to the cathode and anode flow fields. Suguira et al. disclose a fuel cell comprising bipolar plates 14, 16 having a fuel flow side 14a and a coolant flow side 16a. The coolant flow field is off-set from the fuel flow fields, which allows for thinner bipolar plates. See Figure 2. It would have been obvious to one of ordinary skill in the art at the time of the invention to use the arrangement of flow fields of Suguira et al. in the fuel cell of Ohara et al. because it provides for thinner bipolar plates to reduce the overall size of the fuel cell. Upon parallel rearrangement, an upstream portion of the cooling fluid channel would correspond to a region of the anode and/or cathode side gaps and a middle stream portion would correspond with the fuel and oxidant gas channels.

With respect to claim 2, Ohara et al. disclose the polymer electrolyte membrane (203) to have a larger main surface than the electrodes (201, 202). The gaskets sandwich the entire periphery of the polymer electrolyte membrane (see Figure 38). The anode-side gap comprises boundaries of the anode, polymer electrolyte membrane and the anode-side gasket and the cathode-side gap comprises boundaries of the cathode, polymer electrolyte membrane and the cathode-side gasket. See Figure 43.

With respect to claim 3, the limitation is a method of use. Ohara et al. disclose the same configuration as discussed above with respect to claim 1, and thus it is the position of the examiner that the limitations of claim 3 would occur during use of the fuel cell. Further, Ohara et al. disclose the configuration having the clearance gaps ensures discharge of water. See [0081].

With respect to claim 4, Ohara et al. disclose the configuration as discussed above with respect to claim 1, wherein the upstream portions of the cooling fluid channels correspond to the anode/cathode clearance gaps and the middle stream portion correspond to the fuel/oxidant gas channels. See Figs. 34, 36 and 43, for example.

With respect to claim 5, Ohara et al. disclose the anode and cathode clearance gaps formed by continuous sealant members (which appear to have the same shape as applicant's "continuous circular members") having coolant inlet and outlet manifolds. See Figures 7, 9 and 43. The reactant inlet to outlet path is diagonally across the fuel cell stack, and thus both routes of Ohara et al. would be the same length. However, it would have been obvious to one having ordinary skill in the art at the time of the invention to rearrange the flow field inlets and outlets to be directly across from one another, since it has been held that rearranging parts of an invention involves only routine skill in the art. *In re Japikse*, 86 USPQ 70.

With respect to claims 6 and 7, Ohara et al. disclose the configuration as discussed above with respect to claim 1, wherein the upstream portion of the cooling fluid channel corresponds to first and second routes of the anode/cathode side gaps.

With respect to claim 8, Ohara et al. disclose the configuration as discussed above with respect to claim 1, wherein the streams of the coolant and fuel and oxidant channels correspond to each other.

With respect to claim 11, Ohara et al. disclose a fuel cell stack comprising the fuel cells as discussed above with respect to claim 1. See Figure 11.

With respect to claim 12, Ohara et al. disclose gaps between the sealants 150, 180 and the electrodes 201, 202 as discussed above. See Figure 43. As is depicted for example in Figure 24, the membrane electrode assembly (dotted line) is larger than the flow fields. Thus, the length of the anode and cathode side-gaps would necessarily be longer than then length of the upstream coolant flow field channel.

With respect to claim 13, Ohara et al. do not explicitly disclose the limitation. However, it is the position of the Examiner this limitation is simply a mode of distinguishing the portions of the fuel gas channel and oxidant gas channel that are so-named "the middle stream portion and subsequent portion" of each gas channel, as discussed in the instant specification at paragraphs [0033-0036], and thus does not further limit the product of the fuel cell of claim 1.

Response to Arguments

5. Applicant's arguments filed October 1, 2010 have been fully considered but they are not persuasive. Applicant argues:

a) The arrangement of the prior art would not provide the upstream portion of the cooling fluid channel to correspond to the middle stream portion and subsequent portion of the reaction gas channel.

The Examiner respectfully disagrees. It appears the applicant is intending to claim the invention of Figure 3 of the specification, but it is the position of the Examiner that the claim language is much broader, in that "upstream", "middle stream", and "downstream" do not provide clear boundaries of where one begins and one ends, but instead are simply along the stream and upstream or downstream from another portion of the stream. That is to say, a portion of the "upstream" cooling fluid channel, even can be interpreted to extend into a portion or even the entirety of the middle stream section of the fuel fluid channels. Without specificity, it is the position of the Examiner that the rejection is proper.

b) Comparative Example 1, which relates to Ohara et al., does not exhibit sufficient power generation performance.

While Table 1 shows superior results with respect to Example 1 versus Comparative Example 1, it is the position of the Examiner that Comparative Example 1 is operable and would yield the predictable results of an operating fuel cell. Example 1 is notably superior according to the results of the instant specification, however it is the position of the Examiner that Example 1 is not commensurate with the scope of the claim because the specificity of the Example 1 is not captured in the coolant flow field as claimed.

Contact/Correspondence Information

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Steven Scully whose telephone number is (571)270-5267. The examiner can normally be reached on Monday to Friday 12pm to 8pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Barbara Gilliam can be reached on (571)272-1330. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/S. S./
Examiner, Art Unit 1727

/Barbara L. Gilliam/

Supervisory Patent Examiner, Art Unit 1727